

A Study of the Future of Solid Waste Management: A Report to the Wisconsin Legislature

Executive Summary

The Wisconsin Legislature directed the Department of Natural Resources, in cooperation with the University of Wisconsin Extension, to “conduct a study of the future of solid waste management, including an examination of ways to increase the efficiency and effectiveness of current recycling programs and an examination of ways to improve coordinated and cost-effective management of solid waste in Wisconsin” in the 1997-1999 Budget Bill. This report:

- explores current waste management trends and issues facing Wisconsin, including increasing concern about non-recyclable, complex and hazardous components in our municipal solid waste stream,
- makes recommendations for improving efficiency and effectiveness, with emphasis on recycling and solid waste management services, and
- provides a foundation for further involving stakeholders to develop a shared vision and goals for the way we manage solid waste materials in the future.

I. Findings and Trends

The following presents some of the trends and findings identified in the study, based on a review of information and discussions with stakeholders involved in Wisconsin’s solid waste management and recycling efforts.

A Statewide Perspective

1. Wisconsin’s waste management professionals and stakeholders express a wide range of views about our current pattern of waste management and what needs to change or improve in the future. Opinions are fairly polarized on issues such as who should bear the costs of recycling programs, how much recycling is enough, the use of financial incentives to influence product manufacturing, waste reduction, recycling and disposal behavior, and the right mix of public and private sectors in planning and providing services. Although people often express support for current recycling efforts and “keeping as much as we can out of landfills”, no broad agreement on the issues facing us exists at present, nor has a common vision or goal emerged for improving our patterns of use, recovery and disposal of waste materials.
2. Most of Wisconsin’s municipal solid waste generation is managed by landfill disposal (60%); recycling and composting programs divert 36%, and waste-to-energy combustion uses 4%. If we also factor in the yard wastes managed on-site by backyard composting, mulching and other source reduction methods, Wisconsin’s diversion rate is 40%.

3. Although we have a “waste management hierarchy” in statute, the only mechanisms to implement the concept for municipal solid waste are Wisconsin’s Recycling Law (the “landfill bans” for specific materials and effective program approvals for local recycling programs) and local recycling ordinances. Other than DNR’s statewide regulatory responsibility, Wisconsin law does not assign oversight or responsibility for waste disposal to any level of government.
4. Unlike some of our neighboring states, notably Minnesota and Iowa, Wisconsin has no requirement for coordinated planning, development and delivery of comprehensive waste management services (disposal, recycling, composting, household hazardous waste collection services).
5. Average landfill tipping fees declined in the mid 1990’s, possibly because significant quantities of waste diversion occurred once the Recycling Law was fully implemented. Wisconsin’s tipping fees (\$38/ton on average) continue to be low compared to those in neighboring states. Waste imports from other states have risen steadily since 1996, reaching 1.4 million tons in 1999.
6. Since 1990, Wisconsin’s Recycling Law has been the primary “driver” for municipal solid waste recycling programs by specifying the materials to recycle based on toxicity or hazard to the environment (oil, lead acid batteries and appliances), ease of home management/potential hazard if landfilled (yard waste), and recyclability as raw material for various industries (cardboard, newspaper, magazines, office paper, bottles, cans, and tires).
7. In aggregate, local governments report recovering increasing amounts of recyclable material each year, but inevitably the total statewide diversion of the materials specified for recycling must level off or plateau as recovery approaches the limits of those materials available from residential generators. At the same time our population and economy are growing, factors which historically produce more solid waste. However, the fact that some communities and businesses have much more effective recycling programs than others suggests an opportunity to increase both efficiency and effectiveness by refining existing programs.
8. The larger part of Wisconsin’s municipal solid waste stream, composed of materials we do not recycle or reuse, continues to grow. Even more important than the growing quantity is the growing complexity of materials such as multiple layer plastic containers and the potential toxicity of wastes such as cathode ray tubes in computers and televisions, and products containing mercury and other persistent bioaccumulative toxics (PBTs).
9. Although burn barrels are approved for use in specific areas for disposal of clean paper and unpainted wood, growing scientific evidence indicates that the common practice of burning household waste in burn barrels releases high amounts of PBTs with associated human health risks and general environmental contamination. Recent EPA data indicate that burn barrels are potentially one of the largest sources

of airborne dioxins and furans in the United States. In particular, EPA found that 2 to 40 households using burn barrels emit as much dioxins and furans as a municipal solid waste incinerator burning 200 tons a day.

10. Wisconsin's landfill design and construction requirements as well as financial responsibility requirements need periodic evaluation with respect to changes in the industry and current research. For example, bioreactor landfills with leachate recirculation have been proposed as a method to degrade organic wastes and minimize long-term risk to the environment around landfills. This may have impacts on the financial responsibility owners have for landfills using these new technologies. Alternatively, removing organics from the waste stream going to landfills might provide a more direct approach to the same end.

Efficiency, Effectiveness, and Cost-effectiveness

11. The Legislative charge uses three terms as the basis for the analysis: efficiency, effectiveness, and cost-effectiveness. There are a number of possible definitions for these terms and ways to measure them in the context of waste management and recycling. Wisconsin's Recycling Law does not use the terms efficiency or cost-effective, and does not require evaluation of local programs on the basis of costs.
12. The Recycling Law specifically directs local governments to develop "effective recycling programs", with emphasis on maximizing benefits. Cost-effectiveness of programs became a topic of discussion in the mid-1990's, once programs were fully operational and review of their costs and benefits showed wide variation in costs.
13. For the purposes of this study, the terms efficient and efficiency refer to monetary cost per unit, while effectiveness refers to outcomes or benefits, such as the amount of material collected for recycling, or the reduction in pollutants or waste generation. The term cost-effective implies a comparison of costs among alternatives that achieve the same objective.
14. The benefits gained by recycling and composting residential waste may not be accounted for as a savings due to recycling, or may not even accrue directly to the local governments managing the recycling program. When recycling results in reduced garbage collection costs (reductions in fleet size, number of garbage routes, and labor), these savings are not typically accounted as a savings by the recycling program. Typically this occurs when different units of government organize recycling and waste disposal for an area; one unit of government may realize savings, while the other bears increased costs. In such circumstances, the responsible for recycling may not reap any direct savings from recycling and so may not have financial incentive to expand or improve the program.
15. Savings and benefits from recycling and composting accrue to our state and our environment as a whole. Based on preliminary results from a life cycle analysis, Wisconsin's recycling effort has produced net reductions in energy consumption,

pollutants that contribute to ozone and acid rain, and greenhouse gas emissions. Overall, Wisconsin's waste diversion efforts over the last 10 years have avoided the need to construct 5 average size landfills. These statewide savings do not show up in recycling program accounts to offset program costs.

16. Many recycling programs in Wisconsin will continue to be at a significant cost disadvantage as long as the measure of cost-effectiveness is to compare per ton recycling costs with per ton waste disposal costs. In 1998, the average cost for Wisconsin local governments to dispose of waste was about \$85 per ton, including collection, transportation and disposal (tipping fees). The average cost for all recycling services (including curbside/drop-off recycling and yard waste management) was about \$ 95 per ton, including collection, processing, marketing and public education. It would be more accurate to evaluate cost-effectiveness of programs based on the incremental savings (or cost) for recycling compared to waste collection and disposal costs before recycling was implemented. However, since many Responsible Units for Recycling do not manage waste disposal, they lack data to calculate the incremental cost of their programs.
17. In 1999, the grant-eligible costs submitted by Responsible Units for Recycling totaled \$76.4 million or \$14.40 per capita as a statewide average. Indian Tribes had the highest costs (\$37.30 average per capita). Per capita costs for city and village responsible units were somewhat above the average at \$17.40 and \$18.30 respectively. The higher average costs are to be expected, given that most cities and villages offer curbside collection of recyclables to parallel garbage collection service. Conservatively, about 40% of city and village program costs are attributed to yard waste collection and management.
18. County Responsible Units had slightly below average per capita costs (\$10.60) as do township RUs (\$9.70) and "other" RUs (\$7.80) in 1999. The lower than average costs are to be expected, given that most county programs did not encompass curbside collection costs and are in a good position to realize economies of scale with the operation of drop-off sites and/or a county processing facility for recyclables. Rural programs typically do not collect yard waste, thereby avoiding those costs.
19. Although a number of high-cost recycling programs exist, these tend to occur in areas where it is difficult for Responsible Units to obtain competitive bids for service contracts and/or travel distances to processing facilities or markets are greater than average. Technical assistance on contracting, voluntary regional cooperation and county leadership to develop waste management plans, umbrella bids and contracts (for municipalities to use) have good potential to "level the playing field" and reduce costs for both recycling and waste disposal.
20. When we look at costs on a per capita basis, as opposed to per ton basis, recycling costs compare favorably with the cost of waste disposal. A study of 25 curbside programs for Wisconsin's larger cities showed 1997 waste disposal costs of \$21 per capita on average. Recycling costs were \$ 9 per capita on average and yard waste

management cost an additional \$ 7 per capita on average for the 25 curbside programs. The range of average costs for recycling shows as much or less variability on a per capita basis than other municipal services such as police and fire departments.

21. Recycling programs incur relatively high costs when they sort, bale and market various grades of plastic containers. The apparent trend in the beverage and plastic container industries is to introduce more multiple-layer plastics and various color PETE containers. Local governments and material processing facilities can expect to incur higher costs for sorting (and often discarding) the new plastics without receiving additional revenue to offset the costs.
22. The situation with plastic containers makes local government programs wary of the potential costs and risks involved in collecting new materials such as cathode ray tubes/electronics, carpeting, paints, small batteries, and products containing mercury. Product designers, manufacturers and retailers are in the best position to organize an infrastructure that provides efficient and safe recovery and recycling of these materials. Some manufacturers, for example Sony and the carpet industry, have begun to take an active role in product stewardship.

II. Next Steps and Recommendations

Next Steps for DNR and UW-Extension

To address these findings and trends, the DNR and UW-Extension have agreed to focus on options that can be implemented under current state statutes. These include:

1. Initiate a consensus-building process to develop common expectations and goals/objectives for improved waste management in Wisconsin, using the Environmental Management System (EMS) model with extensive stakeholder involvement. The EMS framework and environmental goals/objectives are expected to guide a shift in our thinking from management of wastes to sustainable management of materials. This effort could eventually result in statutory changes and may have an impact on the suggestions listed below.
2. Develop a policy framework to reduce pollution from persistent, bioaccumulative toxics (PBTs); revise and update solid and hazardous waste regulations as needed to be consistent with the new framework.
3. Wherever cost savings and increased efficiency can be gained, encourage counties and local governments to coordinate delivery of recycling, waste disposal, household hazardous waste collection and special waste management programs (for materials such as tires and electronics). This will entail using current resources as well as supporting the development of new incentives.

4. Building on the major recycling education and outreach efforts that began in 1990, identify new messages and methods to sustain the success we have had with changing behaviors regarding recycling and waste reduction. Continue information and outreach activities targeted toward recycling program managers, haulers, waste facility operators, businesses and the public on waste reduction, recycling and waste disposal. Develop initiatives to reach newly identified audiences and sectors. DNR and the UW-Extension should continue to offer and provide assistance to local government managers to analyze program costs and identify opportunities to improve cost effectiveness.
5. Support and encourage the efforts of manufacturers, retailers and generators to create systems for recycling additional materials, especially computers, electronics, textiles, food waste, carpeting, paint, batteries, construction and demolition debris, pallets and wood waste. Both agencies should actively encourage voluntary actions by manufacturers to reduce the quantity and toxicity of their wastes and to take responsibility for the recovery of their products for recycling or reuse.
6. Review specific recyclable materials using life cycle analysis tools to calculate environmental costs and benefits. Work with industry, business and local governments to develop an infrastructure to recycle appropriate materials. If other alternatives fail to reduce landfill disposal, give careful consideration to additional landfill disposal bans for materials that may prove to have significant environmental benefit to recycle. Also, consider dropping landfill disposal bans for materials that have least benefit to recycle.
7. With stakeholders, carefully examine limits to the width and depth of municipal waste landfills to ensure that: a) design elements (such as leachate collection piping) can be maintained over the decades of operation and post-closure, and are not be buried so deeply as to be unrepairable; and b) gas extraction technology is effective throughout the entire depth of a landfill.
8. Evaluate, with stakeholder involvement, and adopt regulations to allow development of new landfill technologies that could minimize long-term risks to the environment. In particular, seek flexibility from EPA to allow moisture addition (such as noncontainerized water bearing wastes) in select municipal waste landfills to fully investigate the “bioreactor” concept. Also examine eliminating organics from landfills or treating organics before landfilling, as an alternative method of reducing long-term risks to the environment.

Recommendations for Legislative Consideration

In addition to the initiatives outlined above, the Department of Natural Resources and the UW-Extension suggest that the Wisconsin Legislature consider the following ideas to address the issues identified in this report:

9. Consider the outcome of any policy suggestions from the Environmental Management System process currently underway at DNR.
10. Develop a set of financial mechanisms (tax rebates for recycling of industrial materials, credits for technologies that reduce or eliminate waste generation, and solid waste disposal fees) designed to encourage waste reduction and recycling, and discourage waste disposal. Such mechanisms would enhance the management of waste according to the current waste management hierarchy, improve the cost-competitiveness of recycling and stimulate the use of more efficient production technology.
11. Develop new incentives to encourage communities to examine coordination of solid waste management activities wherever cost savings and increased efficiency can be gained.
12. Volume considerations, toxicity, and/or the ability to reuse or recycle are especially important for certain materials presently in the waste stream. These include computers, electronics, textiles, carpeting, paint, batteries, food waste, construction and demolition debris and products containing mercury or other persistent bioaccumulative toxics (PBTs). Consider appointing a Task Force or Legislative Council study committee, or directing the Department to further evaluate product stewardship initiatives for these special materials, and establish policy, as appropriate.
13. In view of the mounting scientific evidence indicating that the use of burn barrels is a significant source for human exposure to persistent bioaccumulative toxics (PBTs) and the release of PBTs to the environment, appoint a Task Force or direct the Department to examine and recommend further action related to use of burn barrels.
14. Increase the 40-year post-closure financial responsibility period for new municipal waste landfills and lateral expansions to more closely reflect the period of care actually expected to be necessary.

III. Conclusion

Wisconsin has been recognized nationally as a leader in solid waste management and recycling. These programs have served as models for other states, as well as for national programs. The breadth of the solid waste management program in Wisconsin is significant, covering such wastes and management practices as recycling, hazardous waste from households and businesses, tires, medical wastes, industrial by-products, littering, land application and landfills.

As a result of these programs, industrial waste is reused or recycled effectively; landfill design is more protective of the environment than 10 years ago; solid waste is managed to prevent nuisance conditions and to protect the environment; the diversity of services provided in Wisconsin is good; and municipal solid waste is recycled or reused so that

40% of it is diverted from landfills. The per capita solid waste generation in Wisconsin is 3.97 #/person/day (1995) as opposed to 4.41 #/person/day (1995), nationally. People and businesses in Wisconsin are committed to reducing the amount of waste they generate and managing it effectively to protect the environment.

Improvements to the solid waste management systems in Wisconsin should continue so that this state remains a national leader. While a number of suggestions have been included in this report, one should be completed early so that other improvements can be completed in a holistic way, involving the many stakeholders interested in waste management. Using the environmental management system tool (ISO 14001), with extensive stakeholder involvement, common expectations and goals and objectives for waste management in Wisconsin will be developed. This will help clarify the goals and strategies the DNR, UW Extension and other stakeholders use to manage waste in Wisconsin and provide for any changes needed to improve or shift the programs.

The Department has already begun using the EMS in policy for the waste management program, involving UW Extension and other stakeholders in how best to approach establishing common goals and objectives including a broad array of interests. More information on what other states are doing in the area of waste management would be collected as part of this effort. The goal of this effort is to improve the use of public resources in managing wastes in Wisconsin, and to eventually shift thinking from management of wastes to sustainable management of materials. In the interim we will continue to pursue the initiatives outlined above to continue to provide the quality of service the residents of Wisconsin expect.